

electrician a study of the fundamental magnetic measurements rather than the perusal of treatises of this nature.

LEDGER'S SUN AND ITS PLANETS.

The sun, its planets, and their satellites. By Rev. EDMUND LEDGER, M.A. London, *Stanford*, 1882. 432 p. 12°.

OF late a considerable number of semi-popular works have appeared on astronomical subjects. They seem to meet a felt want of the community, and have been very successful. We call them *semi-popular*; because, while they are not written for professional astronomers, they are adapted, in their style and mode of treatment, less to the great masses of the business and laboring population than to the educated people who are engaged in various professional occupations. Those, for instance, who are busy in teaching, or with the practice of medicine or law, or who are pursuing geological or biological research (in short, pretty much all who would naturally subscribe for *SCIENCE*), generally wish to keep *au courant* of what is going on in other than their own special lines of work, and are delighted to find what they want, when they can get it in an attractive form.

Mr. Ledger's book is an excellent one of this class. It is less diffuse than Mr. Proctor's essays, and not quite so imaginative. It is narrower in its scope than Professor Newcomb's *Popular astronomy*, but easier reading, and fuller of detail in respect to the subjects of which it does treat. It makes no special claims to originality, but is accurate and clear, and the style is unpretentious and agreeable. The book is nicely gotten up, and very well illustrated. Altogether, we have no

hesitation in pronouncing it a volume well worth reading and possessing.

It is made up of fifteen lectures read in 1881 and 1882 in Gresham college, London. Two are upon the sun, two are devoted to the moon, two to the earth, and two to Jupiter and his satellites. Each of the other planets has a chapter to itself (counting the group of planetoids as one), and there is a chapter entitled '*Ptolemy versus Copernicus*.' Naturally, the lectures are not all of equal interest and value; but none of them are poor, or could be well dispensed with. The chapters upon Mars and the planetoids strike us as particularly good, and contain information not otherwise very easily accessible. The chapters on the sun and moon are also excellent, though naturally enough, in the main, only an abridgment and compilation from the recent books on these subjects; to which books the author handsomely acknowledges his obligations.

There are remarkably few mistakes in the work: in fact, in reading it over for this notice, we have found none at all, unless we count as such, a blunder in the illustration on p. 147, representing the comparative size of the sun as seen from Mercury at perihelion and aphelion; the difference being represented very much greater than the truth. Speaking of illustrations, the fine Woodbury-type of the eclipse of 1871 deserves special mention, and several of the pictures of Mars and Jupiter are unusually excellent. It is rather a pity that a few pages of tables were not appended, containing the numerical statistics of the planetary system. They would have greatly increased the value of the book for those who wish not merely to read it once, but to keep it on their shelves for occasional reference.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Flexure of the broken transit.—Professor C. A. Young, after alluding to the fact that the flexure-correction of this peculiar form of transit is not treated of in any of the common text-books on practical astronomy (not even in Sawitsch, who specially describes and discusses the instrument itself), states the theory of the correction to transits of stars observed with the 'broken transit,' which is often so great as to amount to a large fraction of a second of time at the zenith. The constant of flexure must be known, and its effect eliminated, before the collimation error can be determined by reversal of the instrument on a circumpolar star. The correction has the same co-

efficient with the level-error; and denoting this latter, as usually obtained, by b , the flexure-constant by f , and the pivot-correction by p , the complete formula for the 'level-constant' is $[b \pm (f \pm p)]$. Thus, by flexure, the time of transit of a star is affected by $f \cos z \sec d$. The sign of f changes with the reversal of the instrument, being always plus for eye east, and minus for eye west. Prof. Young gives several methods of determining f : by observing zenith stars in reversed positions of the instrument, by means of the collimating eye-piece and mercury-basin, or a vertical collimator supported above the instrument, and by least-square treatment of equations given by repeated observation of suit-